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UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
WASHINGTON, D. C.

FIELD LETTER

July 1, 1915.

No. 6.

DIVISIONS: DIVISION OF CONSTRUCTION
 V. M. Peirce, Chief.
Projects:

Object-Lesson Roads

E. S. Alderman, J.H.E., has completed the oil-sand and bituminous macadam object-lesson road at Ocala, Florida, and was assigned on June 26 to assist the authorities of the University of Florida at Gainesville, to build about a mile of model road on the University Campus. B. A. Anderton, Assistant Chemist, of the Division of Chemistry, cooperated with Mr. Alderman on the work at Ocala.

J. H. Dodge, S.R.C., completed a sand-clay object-lesson road 1600 feet in length, in Vanderburg County, Indiana, June 19. He immediately reported to Paul D. Sargent, Chief Engineer, State Highway Department, Augusta, Maine, to assist him in building sand-clay roads at Mechanics Falls and Welchville.

B. F. Heidel, S.H.E., conferred with B. H. Burrell, S.H.E., at Asheville, North Carolina, June 12-18, relative to the bituminous macadam construction which Mr. Burrell is supervising in Buncombe County. He also conferred with the County Commissioners at Greenville, South Carolina, assisting in planning for the proper expenditure of a \$1,250,000 bond issue recently authorized by the State Legislature for improving the roads of the county.

C. H. Moorefield, S.H.E., left Zanesville June 23 for Fort Wayne, Indiana, to confer with H. C. Wells, S.R.C., relative to the construction of concrete roads in Allen County, Indiana, and returned to his post road work in Zanesville on June 26.

Chas. T. Harrison, S.R.C., will complete the gravel object-lesson road at Brinkley, Arkansas, about July 1, and will then proceed to deliver a series of lectures in Avoyles Parish, La.

W. H. Lynch, S.H.E., was assigned June 12 to assist the county authorities of Alamance County, North Carolina, in rebuilding and surface-treating a section of worn out macadam road near Eton College.

Advice and Inspection.

H. L. Arbenz, S.H.E., made a reconnaissance survey and report of a proposed road through the Cumberland Mountains, from Lafayette to Jellico, Tennessee, on June 20 to 26.

Post Roads

North Carolina:

The post road from Winston-Salem to Statesville is entirely completed through Davie County and practically completed through Forsyth and Iredell Counties.

Experimental Construction:

Plans and specifications were prepared for seven experimental sections to be built on the Russell Road, Alexandria County, Va. Bids were received June 22, and contract was awarded to the Wm. P. McDonald Construction Company - the same company that is now constructing the Mount Vernon Avenue Road experiments. L. I. Hewes, S.H.E., will be in charge.

The experiments that are out of the ordinary in general road construction are as follows: bituminous-macadam with a coal-tar binder and an oil-asphalt seal coat; also bituminous macadam with a water-gas-tar binder and an oil-asphalt seal coat. Bituminous macadam, using screened gravel instead of crushed stone in wearing course, one section to be regular penetration work and one section to be grouted with a tar-sand mixture (equal parts by volume of tar and sand.) A section of gravel road, 500 feet in length, will be built and surface-treated with residual asphaltic petroleum.

Bridge Work

O. L. Grover, Bridge Engineer.

O. L. Grover, B.E., has recovered from typhoid fever and is back at the Office.

Plans are being made for the elimination of grade crossings on the Mount Vernon and Russell Experimental roads, in Alexandria County, Virginia.

A design for an 85-foot steel truss span with wooden floor is being prepared for Grayson County, Kentucky.

Plans for a bridge having two 30-foot I-beam spans with concrete slab floor to take regular paving, are being made for Winston-Salem, North Carolina.

O. W. Childs, S.H.E., is making an inspection of bridges on the Shenandoah Valley Turnpike in Virginia.

L. W. Erickson, H.B.E., was married on June 2, to Miss Esther E. Harroun of Watseka, Illinois.

DIVISION OF PHYSICAL TESTS, FIELD EXPERIMENTS AND RURAL ENGINEERING.

E. B. McCormick, Mechanical Engineer.

Projects:

Physical Tests.

The work of the physical laboratory has been largely taken up with the routine testing of road materials. Fifty-five samples were received from June 1 to June 28, inclusive. Sixty-three reports were sent out during the same period.

The fourth series of readings on the Ohio Post Road were made during the week ending June 19. The observations taken on this road, as well as those taken on the Chevy Chase Road, show

that the sections containing gravel as an aggregate have cracks occurring much more frequently than those in which limestone is used as the aggregate. The readings taken so far on both the roads indicate that changes in length are due more to variations in temperature occurring from season to season than to changes in moisture conditions.

Concrete Investigations.

E. B. Smith, A.M.E., is continuing the tests on the second reinforced concrete bridge slab at the concrete slab laboratory at the Arlington Experimental Farm. The Hearst-Selig Company have arranged to take motion pictures at the time this slab is broken, the films of which will be incorporated in their weekly news service.

Traction Tests.

The repairs to the dynamometer wagon have been completed and the wagon is now in the paint shop. The dynamometer is being assembled with some slight changes in the original design, and it is expected that the outfit will be ready for the field shortly.

The computations for the Florence, Ala., and Rockville to Potomac, Md., projects have been completed. The results, though not so marked as in the Ames, Iowa, project, have brought out some very interesting points in connection with this work.

Rural Engineering.

Farm Structures:

Assistance has been rendered the Bureau of Plant Industry during the last month in the preparation of architectural drawings for an experimental syrup mill at Cairo, Georgia.

Many blueprints and photographic prints of farm houses, barns, and hay sheds, including one tobacco shed, have been sent out.

The answering of many questions that come within the category of farm structures constitutes an important part of the work, but the results are not so much in evidence as building plans and bulletins.

The assistants, reported in the field last month, have returned and have been preparing the notes, sketches, and photographic prints obtained for permanent record.

Working drawings are in preparation for four and five-room farm houses, for general barns, and for another portable building for a convict camp.

Farm Domestic Water Supply and Drainage:

G. M. Warren has been assisting Mr. McCormick with this line of the work, and many requests have been received for advice along the lines of sewage disposal and water supply for residential plants. These have received attention and there is now in preparation a type plan for a country residential sewage disposal plant embodying details of a septic tank, siphon chamber, and absorption fields. This plant will be installed near Washington, and will be used as an object lesson and also for experimental purposes.

Problems Involving Mechanical Principles:

A. M. Daniels, A.M.E., has been assisting in this line of the work. Requests for information and advice along the following lines of subjects have received attention: electric lighting plants for farms and rural communities; use and operation of oil engines; ice houses and ice and refrigerating houses. A hot-water heating plant has been designed, and specification and itemized list of material have been prepared for the Bureau of Plant Industry's Cooperative Experimental Laboratory, located at Sacaton, Arizona. Work has begun on the study and collection of data for the preparation of a bulletin on the "Development of Power on the Farm." It is the intention to have this work cover not only a general discussion of the different sources of power and the varying uses to which it may be put on different types of farms, but to discuss also the advantages and disadvantages of each, together with detailed instructions on how to proceed with preliminary surveys, supplemented with data and costs of successful farm power plants.

In connection with this work, and also with that in the water supply and sewage disposal, it is earnestly urged that each of our field men observe any novel or unusual systems which may be a feature of such plants, in operation in the neighborhood in which he is working, and that he send a detailed description of the same to his division chief for transmittal to Mr. McCormick. This co-operation on the part of field men should prove of inestimable assistance in securing material for the bulletins.

Cooperative work in Rural Engineering:

In cooperation with the Bureau of Chemistry and the Bureau of Mines, the Office will start investigations early in July to determine if possible the exact cause of grain separator explosions that have occurred with great frequency in the Northwest, and to devise, if possible, methods for preventing these explosions. From information now available, it appears that the explosions are due to the formation of an explosive mixture of air, grain dust, and smut, and that the ignition comes either from the static electricity generated by the revolving drum of the separator or from the spark due to the presence of gravel or grit in the grain. Some of the remedies that will probably be tried are: First, grounding the moving parts of the separator to moist earth in order to discharge the static electricity as soon as formed; second, attaching a blower near the front end of the separator in order to remove enough of the dust to prevent the formation of an explosive mixture; third, devising and attaching some form of sprinkler system that will smother the fire if an explosion occurs. As some 300 explosions occurred last year in the neighborhood of Spokane, Washington, it is probable that the first work will be begun in that locality.

In cooperation with the Bureau of Plant Industry and the Bureau of Entomology, an investigation will be started to determine the mechanical efficiency of the various types of spraying machines now used in orchard operations and similar activities. This work will be conducted in part in the Office laboratory on the Arlington Farm and in part in the field.

DIVISION OF ROAD MAINTENANCE.
E. W. James, Chief.

Projects:

Representative County Systems

Work on a system of county maintenance control, having for its basis a county road map and a simple system of road accounts, is nearing completion.

Post Road Maintenance.

Arrangements are now being made for surface treating the water bound limestone-macadam post road from Rockville to Potomac, Montgomery County, Maryland. The original construction contract was held open for this purpose, and the Division of Construction will turn the road over to the Division of Maintenance as soon as surface treatment has been made. It is intended to appoint an additional patrolman, and to undertake the maintenance of this post road on the same basis as the maintenance of the Rockville Pike. The Division of Chemistry, in cooperation with the Division of Construction and this Division, has planned a series of experimental sections in connection with this re-treatment work.

Washington-Atlanta Highway.

Applications have been received or renewed from the following counties and districts:

GEORGIA

June 1, 1915	- Clarke County.....	\$915.00
April 5	- Granville County.....	2100.00
June 7	- McDuffie County.....	1425.00
June 5	- Walton County.....	1395.00
June 2	- Warren County.....	885.00

NORTH CAROLINA

March 1, 1915	- Cumberland County.....	\$600.00
April 5	- Durham County.....	2000.00
May 4	- Harnett County.....	600.00
June 8	- Johnston County:	
	Banner Township.....	1050.00
June 4	Clayton District....	540.00
June 5	Ingrams Township....	420.00
June 5	Smithfield Township.	800.00
May 5	- Wake County.....	3000.00

SOUTH CAROLINA

June 1, 1915	- Aiken County.....	\$1450.00
June 5	- Chesterfield County:	
	Alligator Township..	700.00
June 7	Cheraw Township....	500.00
	Cole Hill and Steer	
	Pen Townships.....	375.00
	- Lexington County.....	1000.00

VIRGINIA

April 12, 1915 - Mecklenburg County:

Boydton District.....	\$700.00
Buckhorn District....	60.00
Clarksville District.	150.00
LaCrosse District....	100.00
South Hill District..	300.00

D. H. Winslow, S.R.C., was detailed to Nassawadox, Northampton County, Virginia, June 10 and 11.

W. L. Spoon, S.H.E., was detailed to Williamsburg, Virginia, June 14 to 18. He reports construction begun on the Lynches River bridge in Chesterfield County, South Carolina.

Field Experiments.

D.G.Haire, S.R.C., has been assigned to this division for work on Field Experiments, and is now superintending surface treatments in Montgomery County, Maryland.

Section 7 of the Rockville Pike has been re-treated with asphaltic petroleum (Trinidad "A") top-dressed with torpedo sand. Total repairs preliminary to re-treatment amounted to approximately \$424.47. The total cost of re-treatment amounts to approximately \$702.42.

Section 3 of the Rockville Pike is now being re-treated and the work should be completed within two days. The materials used are an asphaltic petroleum (Mexican Oil) top-dressed with torpedo sand. Except the usual routine surface maintenance, no special repairs were required on this section preliminary to re-treatment. The estimated cost is \$421.73.

Delay in the delivery of refined coal tar has made it necessary to postpone work on Section 1, and on the first half of Section 2 of the Rockville Pike until the first week in July.

Bids were opened June 22 for widening the experimental road on Bradley Lane from ten (10) feet to fifteen (15) feet or more. The plan called for the widening of the road to 16½ feet wherever sidewalk exists, which is for about 2400 feet, and for uniform widening to fifteen (15) feet over the remaining 1440 feet of the Lane. The construction will be bituminous macadam, penetration method. Nineteen hundred feet will be ordinary penetration work using an asphaltic oil.. The other half will be penetration work, using a sand-asphalt grout. The lane will be uniformly widened to 24 feet between ditches and, to permit this, the Chevy Chase Club is cooperating with the Office. The contract has been awarded to the George B. Mullin Construction Company, Washington, D. C., for \$4970.62. Work is to be begun immediately.

Systematic repair of Section 10 of Kensington Road, South, was begun June 25. A large amount of penetration patching is required, and, if possible, arrangements will be made to re-treat the entire surface, following repairs.

New Projects

The Road Board of Providence District has asked for specifications and an engineer to superintend the repair and surface treatment of the Vienna-Fairfax road in Fairfax County, Virginia. Bids will be asked for bitumen for hot treatment July 7. Work will be done by force account.

A letter has been prepared to the officials of the various counties interested in the road from Brooksville to St. Petersburg, on the west coast of Florida, announcing the approval of a maintenance project, and asking their cooperation. It is intended to complete cooperative plans and start this work at an early date in the fall.

Application has been received from Le Flore County, Mississippi, where the Division of Construction with H. H. Lotter, S.H.E. in charge, has been building a post road, for the detail of an engineer to superintend the maintenance of the county roads. This matter is now under consideration and a man will be detailed at the earliest practicable date.

DIVISION OF NATIONAL PARK AND FOREST ROADS

T. Warren Allen, Chief.

Projects:

National Forest Roads

Construction is in progress in nearly all the Forest Service districts, on 10 per cent fund road work.

In District No. 2, (A. E. Palen, H.E., in charge) in Wyoming, work has just been begun for the season on the Buffalo-Hazeltan Road in the Big Horn National Forest; in Colorado, work was delayed on the Rabbit Ear Road by snow until early in June but it is now in progress; in South Dakota, construction is under way on the Deadwood-Hot Springs Road, Black Hills National Forest, near Crystal Lake. Mr. Palen has done considerable reconnaissance work on a road to Pike's Peak, for which permit has been granted to a private company to build a toll road. A survey has been made for a road running south from Denver, Colorado, into Platt Canyon. This is a cooperative work in which the Forest Service cooperates to the extent of furnishing plans. Work has also been done on a survey for the Crested Butte-Somerset Road lying mostly in the Gunnison National Forest; this is also a cooperative project for which the Forest Service is to furnish the plans and supervision of construction and the county and the Rockefeller Foundation the money to build.

It may be of interest to know that the Cochetopa Pass Road which was completed by the Forest Service in Colorado last year, was open across the Continental Divide about the middle of April last, long in advance of any other road across the Divide in Colorado.

In District No. 3, (O. N. Powell, H. E., in charge) construction has been started on the Red River Road in northern New Mexico. It was expected that work would be in progress on the Salt River Road, a project in Arizona near the Roosevelt Dam, but the cooperative money from the county has not yet materialized and it is

likely that work will be held up awaiting the result of a vote on the question of county bond issue. Survey work has been done in this district on the Holman-Rio Pueblo Road. This is a cooperative project about four and a half miles in length in which the Forest Service cooperates to the extent of making the survey. The funds for construction will be furnished by the county and individuals.

In District No. 4, C. H. Kendall, S.H.E., in charge, construction work is in progress quite generally. In Idaho, on the South Fork of the Payette River Road, work has been in progress all winter, using a number of rangers and a few men employed and paid for from the ten per cent fund. Due to shortage of funds the force has lately been reduced. The grading has reached a point known as Pine Flats (Herman's Ranch) to the eastward along the river. The western end of this road is located in what is known as Garden Valley; the county officials have just lately awarded a contract to continue this road westerly to a station on the Idaho Central Railroad. In Wyoming, construction work on the Victor-Jackson or Teton Pass Road is just starting, having been delayed on account of stormy weather. In Nevada, work is in progress on the Secret Pass Road in the Ruby National Forest and considerable rock work is being encountered. In Utah, the Escalante-Winder Road, in the Powell National Forest, is under construction, and the Kamas-Stockmore Road in the Wasatch National Forest. In the Fish Lake National Forest in Utah a force of men has rebuilt three miles of the Gooseberry Road. This project is being done with improvement funds, to enable transportation of supplies and equipment to an experiment station for the study of poisonous plants. Maintenance work is also being carried on throughout the district on roads heretofore constructed. Late in May, Mr. Kendall delivered four lectures before the students in road engineering at the University of Idaho in the City of Moscow, one of the lectures was illustrated; he also talked informally before the Commercial Club of Moscow.

In District No. 5, C. C. Morris, H.E., in charge, work has been confined to the preparation of plans for the Trinity River Road in the Trinity National Forest, California; it is hoped to begin construction on this road later in the season. The project is a very important one and one which means much to the local people. The voters of California will soon be called upon to decide the question of another bond issue for roads; and if it passes there may be money available from it to complete the work which the Forest Service is beginning.

District No. 6, Jas. T. Schuyler, S.H.E., in charge. In the State of Washington work is in progress on two roads, both of them in the Columbia National Forest, Skamania County; the Wind River Road, a project upon which work was begun last year and is now nearing completion; and the Little White Salmon Road upon which work has just been begun. In Oregon, work is progressing in the Siuslaw National Forest upon two roads: the Cape Perpetua which is nearing completion, and the Alsea River Road upon which

considerable work was done last year. Work for the season is just being started on the Alsea River Road. In Alaska construction work is not yet under way.

National Park Roads.

In Yosemite National Park, B. J. Finch, S.H.E., is in charge with J. W. Ball, J.H.E., assisting. Work is progressing on the preparation of plans for the El Portal-Yosemite -Nevada Falls Road, which are being prepared in sections. Road survey work has been discontinued for the present.

In Glacier National Park, T. C. Peterson, J.H.E., in charge, the road survey which was in progress along the westerly side of Lake McDonald has been discontinued for the present and work is being done on the preparation of plans, with the exception of some reconnaissance along the easterly bank of the Lake, and along a road route over the Continental Divide to connect with the road system to the east of the Divide. The Fish Creek Road has been staked out for construction and work of clearing and grubbing the right of way is in progress.

Maintenance

During the month Mr. Allen talked to the Commercial Club of Forest Grove, Washington County, Oregon, and to the County Commissioners of Skamania County, Washington. The question in Forest Grove is largely one of maintenance. The county is in need of better roads, but the maintenance of those they have should receive first consideration. In Skamania County vote will be taken July 17th on the question of bonding the county for \$210,000. At the meeting of the County Commissioners to take up this question, a resolution was approved to request assistance from the Office of Public Roads in the event of the success of the vote on bonding.

Inspection and Advice

Mr. Allen paid an inspection visit to District No. 1, Forest Service, F. E. Bonner, Civil Engineer, in charge of road work. In Idaho, work is in progress on the Priest River Road, and is nearing completion. In Montana, the Troy-Libby Road has just been finished, and good headway is being made on the Meadow Creek Project. Work has also just been begun on a road up along the west side of the North Fork of the Flathead River.

DIVISION OF ROAD ECONOMICS

J. E. Pennybacker, Chief.

Projects:

General Statistical and Research Investigations.

In connection with the assembling of information on road mileage, revenues, and expenditures, a circular letter and a supply of card forms have been sent to each field employee of the Office, with the request that he obtain the information called for upon the cards in any county in which he has the opportunity to do so. Compliance with this suggestion will aid materially in the prompt and

accurate completion of this statistical census. Where the field men ascertain that the data has already been turned in it will of course be unnecessary to duplicate it.

Model Convict Camp.

On account of obstacles of a technical character, the project for the establishment of a model convict camp at Charlottesville, Virginia, has been abandoned and arrangements have been made for the establishment of such a camp in Berkeley County, West Virginia, in cooperation with the State Road Engineer, and the County Board of Berkeley County. A force of between 40 and 50 convicts will be employed under the honor system in the construction of an experimental road toward the cost of which the county and this Office will each contribute about \$10,000. The county will meet all the expense of the convict camp structures and the operation of the camp. On this project at present, J. E. Pennybacker and H. S. Fairbank, H.E., of this Office, and Dr. W. F. Draper, P.A.S., Public Health Service, are engaged, and the work is to be carried into effect immediately.

Advice to State Highway Departments.

E. H. Barber, H. E., engaged on the general project of the economic study of state highway systems, is still with the Kentucky State Highway Department, assisting in its organization and in the installation of a system of reporting and record. Upon completion of this work he will resume his general work, probably taking up the study of the Middle Western States.

Economic Study of County Highway Systems.

R. F. Eastham, H. E., has just completed advisory and lecture work in Daviess County, Ky., and has at the same time made a county management study in that county. Following that assignment, he completed a study of McCracken County, and is now conducting a similar investigation in Madison County, Tenn.

A. S. Brainard, who recently completed the demonstration of a road exhibit at Portland, Me., is now engaged in a study of road work in the town systems of that State.

Railroad Cooperation in Reduction of Road Material Freight Rates

Through correspondence with a large number of railroads a considerable amount of exact information as to railroad rates on road materials has been assembled, and negotiations have been started with most favorable prospects, for a rearrangement of rates so as to much facilitate road improvement. The Southern Railway has indicated its desire to meet the situation in a broad-spirited manner, and it is believed that other roads will show a friendly spirit toward the project.

Economic Study of Road Improvement in Selected Counties.

The results of the studies in eight selected counties, covering the period between 1910 and 1914, are now in process of compilation for publication as a bulletin of the Office. This bulletin has been delayed in order to obtain the 1915 land assessments in Virginia. As these assessments are expected to be available in July, it is hoped that the bulletin can be sent to the printer within a week after the receipt of this information.

Lectures.

L. E. Boykin, A.R.E., has been designated as the Office representative in connection with the exhibit to be made by the Department of Agriculture to be held at the International Dry Farming Congress at Denver from September 27 to October 9. Congress made the appropriation for this Government exhibit.

During the past month L. E. Boykin addressed the State Highway Convention at Jackson, Mississippi, on the need of a State Highway Department for that State.

J. J. Tobin, A.R.E., lectured at Falls Church, Virginia, and at Taneytown, Maryland, during the past month.

Statistical Chart on State Highway Work.

A statistical chart has been prepared for publication, showing road mileage, expenditures, and other interesting information concerning the work of the various State highway departments. It has been sent to each department for final checking. It is probable that within the next ten days this chart will be sent to the printer.

Library, and Publications.

Because of the number of new subjects taken up under the reorganization, the Office has made up a list of about 30 magazines dealing with rural engineering subjects. The publishers of these magazines were written to, and have replied, in nearly every instance, that they will be glad to send their issues, free of charge to the Office.

Two new bulletins, one on trenching machinery and the other on excavating machinery used in drainage, have been sent to the printer. One on land drainage by means of pumps is now being revised, and will soon be in press.

Photographic Section.

A collection has been made of selected photographs donated by each State highway department so that we now have, adequately illustrated, the typical and exceptional road work in each State, aside from our work.

Upon the addition of the divisions of Farm Architecture, Drainage, and Irrigation, the files of the Office received the photographic records of these divisions. The entire selection of photographs, negatives and lantern slides is being placed under a simplified but effective filing system which will much facilitate the work.

DIVISION OF CHEMISTRY
C. S. Reeve, Chemist.

Projects:

The new laboratories have now been almost completely equipped and a large volume of work has gone through during the month. The routine work was particularly heavy incident to the bituminous construction in Florida. Benj. Kamrass, C.A., inspected the last lot of material for the Maine Post Road.

H. A. Draper, Student Asst., who served in the laboratory last summer, is back again for the present summer.

Along the line of standardization of tests, experiments are under way which have for their object the preparation of a standard machined penetration needle to take the place of the No. 2 sewing needle which has been accepted as standard heretofore.

Experimental Bituminous Road Construction and Maintenance.

The bituminous-limestone and bituminous-sand experiments at Ocala are located on the Ocala-Elitchton Road, about $3\frac{1}{2}$ miles west of Ocala, in Marion County, Florida, adjacent to the sand-clay object-lesson road recently constructed there by M. E. Worrell, H.E., and E. S. Alderman, J.H.E.

The bituminous-limestone section is 1177 feet in length, 14 feet wide, with 2-foot limestone shoulders, and was constructed partly on an old sand-clay subgrade, and partly on a sand subgrade. The limestone is a soft easily-crumbled variety obtained about one mile from the road, and as screened for the wearing course, produces roughly 50 per cent retained on a $\frac{1}{2}$ -inch screen and passing a 3-inch screen. A foundation course was constructed of 5 inches of loose, unscreened rock, and rolled until firm. Upon this a 2-inch loose course of screened stone was spread, lightly rolled with a 6-ton tandem roller, and about one gallon per square yard of residual asphaltic petroleum, purchased under specification 0-38 of this Office, was applied by means of hand pouring pots. The oil was immediately covered with the fine sand obtainable in that section, and rolled until firm.

The bituminous-sand experiment extends 793 feet ^{west} of the limestone section, and is 14 feet wide, with 2-foot limestone shoulders. The subgrade on the east end of the work, for 438 feet, was an old sand-clay road, and on this the sand-asphalt mixture was laid $2\frac{1}{2}$ inches thick after compression. The remainder was a sand subgrade, and the surfacing is $3\frac{1}{2}$ inches in thickness. 185 feet was laid in two courses, and 170 feet in a single layer. The mixture, which consisted of an exceptionally well-graded sand, and approximately 10 per cent of oil-asphalt, having a penetration at 25° C. of 5.0 mm., and purchased under specification 0-39 of this Office, was prepared in a Blystone blade mixer having a capacity of 6 cubic feet of sand. The sand was screened to remove roots and other foreign matter, and heated over 15-inch corrugated culvert pipes. The mixture was hauled to the road, a distance of about $\frac{2}{5}$ of a mile, in carts holding 3 batches, and spread from dumping boards with shovels and hot rakes to the required thickness, being laid between timbers placed along the road at the proper grade. As soon as

spread, the mix was rolled longitudinally and transversely with hand rollers, and after standing then some hours, was covered with a light application of Portland cement, and rolled with the 6-ton tandem roller. The timbers were then removed and the limestone shoulders constructed 6-inches thick to support the sand-asphalt surface. The bituminous construction was carried out under the joint supervision of B. A. Anderton, A.C., and E. S. Alderman, J.H.E.

C. S. Reeve, C., cooperated with the Division of Maintenance in the surface treatment of the road in the Department Grounds. Sections 2, 3, and 4 were given a new light surface treatment and a covering of torpedo sand, Section 1 required no treatment.

Plans are about perfected for the installation of five experiments in surface treatment on the Rockville-Potomac Post Road, and also for the experiments on the Russell Road, Alexandria County, Virginia. These will consist of sections constructed by the penetration method, in which coal tar and water-gas tar will be used with both tar and asphalt seal coats. Short sections of bituminous gravel will be constructed by the penetration method, using in one case a tar product and in the other a grout composed of equal parts of tar and sand. On another section, the oil treatment of a lightly scarified gravel surface will be tried.

Bradley Lane will be resurfaced by the penetration method using an oil-asphalt alone and in a mixture with an equal volume of sand.

DIVISION OF DRAINAGE INVESTIGATIONS.

S. H. McCrory, Chief.

Projects:

Administration.

S. H. McCrory, Chief of Drainage Investigations, from June 14 to 18 inspected work on the survey of the Panther Creek Drainage District, Kentucky, in charge of J. V. Phillips.

H. M. Lynde, D.E., during the month, spent a few days at the Washington Office in conference with Mr. McCrory, relative to the work in North Carolina and to some investigations in Carroll County, Missouri. After this conference Mr. Lynde went to Carrollton, Missouri, where he made an examination of conditions in that section. Upon the completion of these investigations he took up the investigation of questions relating to tile drainage practice in Iowa and Illinois.

F. G. Eason, D.E., spent the latter part of the month in the Washington Office conferring with Mr. McCrory relative to work in South Carolina; also regarding a proposed bulletin on tile drainage in South Carolina, to be printed by the State Department of Agriculture.

Frederick E. Staebner and Willis E. Comfort, who have both been recently appointed as civil engineer students, have reported for duty, the former on June 21 and the latter on June 28. Mr. Staebner will assist in the Washington Office a short time and later will assist Mr. Frescoln in the experiments being conducted on the Arlington Farm. Mr. Comfort will assist J. V. Phillips, D.E., in the conduct of the survey of the Panther Creek Drainage District.

The field offices maintained by this division at Baltimore, Maryland, and Roswell, New Mexico, have been discontinued. J. R. Haswell, D. E., who was in charge of the Baltimore Office, has been transferred to the Washington Office, and D. E. Heizer, A.D.E., who had charge of the Roswell Office, will be located in Denver, at which place it is proposed to establish a central office for operations in the Rocky Mountain States. It is probable in the near future there will be but three field offices: one at New Orleans, Louisiana, from which investigations in the Mississippi Valley and Texas will be conducted; another at Denver, Colorado, to cover the Rocky Mountain States; and the third at Berkeley, California, to take care of the Coast section. The engineers operating in the Eastern and Southeastern States will all operate from the Washington Office in the near future.

Farm Drainage

On June 26 to 28, D. L. Yarnell, D.E., met the County Agents and State Leader in charge of the Farmers' Cooperative Demonstration work in West Virginia, at Morgantown, where he discussed with them the needs of tile drainage in that State. Before this meeting he made a survey for a farm near Wellsburg, West Virginia, and conferred with the County Demonstration Agent and assisted farmers at Frostburg, Maryland.

J. R. Haswell, D.E., made surveys for the farm of H. K. Crandall at Wilawana, Pennsylvania.

Reports Transmitted:

- D-7 Northcott Farm, Glenwood, W. Va. - tile drainage planned by D. L. Yarnell, D.E.
- D-26-B Davis Farm, Mobile County, Ala. - by R. L. Grable, A.D.E.

Reports Received:

- D-5 Brown Brothers Farm, Queen Anne County, Maryland - by J. R. Haswell, D.E.
- D-7 Aultz Farm near Sissonville, W. Va. - by D. L. Yarnell, D.E.
- D-7 Crane Farm near Sissonville, W. Va. - by D. L. Yarnell, D.E.
- D-7 Kanawha County Farm, W. Va. - by D. L. Yarnell, D.E.
- D-8-X Borden Farm near Goldsboro, N. C. - by F. R. Baker, A.D.E.
- D-8-X State Hospital Farm, Goldsboro, N. C. - by F. R. Baker, A.D.E.

Overflowed Lands.

On June 15 F. G. Eason, D.E., conferred with and addressed a number of land owners in the Maple Swamp Drainage District near Dillon, S. C.

Lewis A. Jones, D.E., during the month conferred with land owners in the Luxappalilla Swamp and made an examination of the Huntsville Spring Branch, Alabama, and inspected drainage conditions along the Tuscumbia River, Mississippi.

William R. Overton, D.E., has been assigned to assist J. V. Phillips on the survey of the Panther Creek Drainage District.

Fred F. Shafer, D.E., has about completed the survey of the Mayfield Creek Drainage District and will shortly be in Washington to prepare the report and plans.

Reports Transmitted:

D-8-X Second Broad River and Tributaries, Rutherford County, N.C.
by H. M. Lynde, D.E.

D-27 Quiver River Drainage District, Miss. - by O. G. Baxter, D.E.

Reports Received:

D-6 Sandy Creek, Pittsylvania County, Va. - by D. L. Yarnell, D.E.

D-8-X Grindool Creek, Pitt County, N. C. - by H. M. Lynde, D.E.

D-8-X Report on Completed Drainage Districts in North Carolina, -
by H. M. Lynde, D.E.

D-0 Maple Swamp, Dillon County, S. C. - by F. G. Eason, D.E.

Swamp Lands.

Chas. W. Okey, D.E., assisted by J. G. Bennett, is making an investigation of drainage conditions in Florida. Before going to Florida, Mr. Okey revised the map showing the progress in reclamation in Southern Louisiana, by indicating the drainage which has been effected during the past year.

Reports Transmitted:

Abandoned Rice Lands, Colleton County, S. C. - by C. W. Okey, D.E.

Irrigated Lands.

D. E. Heizer, A.D.E., during the month made an inspection of drainage in the vicinities of Las Animas, Colorado, and the Rio Grande Valley, New Mexico.

L. T. Jessup, A.D.E., has confined his investigations during the month to the vicinities of Grand Junction and Canon City, Colo.

Commencing June 3, R. A. Hart, S.D.E., has been inspecting the work in Idaho, Oregon, and Washington.

D. G. Miller, D.E., who has been in the Washington Office during the past six months, will leave on June 30 for the Colorado field.

W. G. Sloan, D.E., has arranged with the officials of Drainage District No. 1, Canon County, Idaho, for conducting a series of investigations in that district. A number of test wells will be installed.

W. W. Weir, D.E., has spent the greater part of the month with the class of the division of Soil Technology, University of California, making field investigations in various parts of the State.

Reports Transmitted:

D-36 Drilling Experimental Wells, Grand Junction, Colorado -
by L. T. Jessup, A.D.E.
D-43 Imperial Valley (inspection), California - by W. W. Weir, D.E

Reports Received:

D-38-C Drainage District No. 1, Maricopa County, Arizona - by R. A.
Hart, S.D.E.

The following bids were received by the Commissioners of
Drainage Improvement, District No. 24, Washington:

A. B. Fosseen and Co., North Yakima, Washington, May 28, 1915.
Delivered before 25th day of June.
Vitrified Clay Pipe, No. 2 Sewer Pipe.

1090 feet	6"	Bell Pipe	\$0.12 $\frac{1}{2}$	\$136.25
2740 "	8"		0.19	520.60
1752 "	10"		0.25	438.00
1400 "	12"		0.31	434.00
2500 "	15"		0.46 $\frac{1}{2}$	1162.50
2700 "	18"		0.69 $\frac{1}{2}$	1876.50
7 - 18" x 18" x 6" Tee		2 $\frac{1}{2}$ feet long	4.20	29.40
5 - 15" x 12" x 6" "		"	2.80	14.00
4 - 12" x 12" x 6" "		"	2.10	8.40
3 - 8" x 8" x 6" "		"	1.56	4.68
7 - 6" x 6" x 6" "		2 feet long	0.84	5.88
2 - 8" Elbow			1.05	2.10
18 - 6" "			0.70	12.60
				<u>\$4644.91</u>

Harbor City Cement Co., 1609 Hewitt Avenue, Everett, Washington.
Time of delivery, 40 days from signing.
Machine made concrete pipe.

Quantity	Article	Type of Joint	Unit Price	Amount
1090 feet	6" concrete pipe	Hub and "Spicket"	\$0.15 per ft.	\$163.50
2740 "	8" " "	"	0.22 $\frac{1}{2}$	616.50
1752 "	10" " "	"	0.30	525.60
1400 "	12" " "	"	0.37 $\frac{1}{2}$	525.00
2500 "	15" " "	"	0.55	1375.00
2700 "	18" " "	"	0.75	2025.00
7	18" x 18" x 6" Tee	2 feet long	3.00 each	21.00
5	15" x 15" x 6" "	"	2.20	11.00
4	12" x 12" x 6" "	"	1.50	6.00
3	8" x 8" x 6" "	"	0.90	2.70
2	8" Elbows		0.82 $\frac{1}{2}$	1.65
18	6" "		0.50	9.00
7	6" x 6" x 6"	"	0.60	4.20
				<u>\$5286.15</u>

The contract was awarded to A. B. Fosseen, of North Yakima, Washington. Other bids were received, but as they did not comply with the specifications, they were not considered.

Peat, Turf, and Muck Lands.

Arrangements have been made for starting extended investigations relating to the practices pursued in draining peat, turf, and muck lands. These investigations will be carried on in various states. R. D. Marsden, O.E., on June 23 left for Ohio, where he will make investigations of peat and muck areas in that State, and probably in Michigan. It is hoped that sufficient data will be collected so that a valuable report can be prepared on this subject. Other engineers will be assigned to these investigations later in the year.

Technical Investigations.

O. G. Baxter, D. E., during the month has been engaged in making channel measurements on various drainage districts in north-eastern Arkansas.

C. E. Ramser, A.D.E., has about completed run-off investigations on the Kootenai River, Idaho.

A manuscript has been prepared on the Prevention of Silting and Erosion in Water Courses by S.W. Frescoln, D.E. This report is now being distributed among the engineers of the Office who have immediate need for it. In the near future copies will be placed in the hands of all the members of the staff.

C. W. Okey, D.E., has submitted data for the past year on Cost of Operation of Pumping Plants in Southern Louisiana, which will be combined with last year's report on the subject.

George M. Warren, D.E., has devoted part of the month to designing a sewage disposal plant for the farm of H. F. Newcomb, Montgomery County, Maryland.

Organization, Financing, and Legal Regulations of Drainage Districts.

Arrangements have been made for making a study of the methods of organizing and financing drainage districts. The various methods which have been pursued by established drainage districts in organizing and financing the same will be studied. Attention will be given to drainage laws and decisions affecting drainage districts. A thorough study will be made of the floating of drainage bonds and a list compiled of bonding houses and banking institutions which purchase such securities.

DIVISION OF IRRIGATION INVESTIGATIONS.
Samuel Fortier, Chief.

Projects:

Administration.

Mr. Fortier left Washington June 26 on an inspection trip throughout the northern half of the arid region. He will go first to Denver, where he will take up the arrangements for the new field office for the Office of Public Roads and Rural Engineering. He will also take up the leasing of a small tract of land in the vicinity of Denver to be used by the Irrigation Division for experiments in the movement of soil moisture. R. B. Sleight, A.I.E., who has been in school during the last year, has been assigned to this proposed experimental tract and will reach there about July 1.

The formal transfer of the Irrigation Division to the Office of Public Roads and Rural Engineering will take place July 1. There will be no change in the organization other than transfer to the new Office. New commissions, without changes in title, have been issued to all of the employees of the Division.

Cooperative Agreements.

A new cooperative agreement has been entered into with the State of Nevada. The amount formerly contributed to this cooperation by each of the parties was \$2,000. This has been increased under the new agreement to \$4,000. The work will be carried on by Chester G. Haskell, I.E., who has been working in the rice districts for several years.

Under the new cooperative agreement with Wyoming, which was signed by the Director of the Office of Public Roads and Rural Engineering and the Governor of Wyoming during the past month, provision is made for the discontinuance of the farms at Cheyenne and Newcastle, and for the carrying on of general studies of the duty of water throughout the State. This work is in charge of J. T. Kingdon, I.E., who is assisted by Mr. Gordon and several temporary agents.

The Arizona Legislature now in session has made an appropriation for continuing the cooperative work in that State, but the State Engineers, rather than the director of the Experiment Station, represents the State in the new cooperation. A new agreement has been drawn but has not yet been signed. P. E. Fuller, I.E., will continue in charge of this work. The experiments to be carried on under this agreement are a continuation of those under the previous agreement.

The Legislature of Utah, at its last session, failed to continue the appropriation for cooperation between this Office and the State Experiment Station, but the officers of the State Experiment Station have expressed their desire to continue the cooperation, using a part of their regular funds. An agreement has been drawn but has not yet been signed. L. M. Winsor, Agent, will continue in charge of this work.

Reports.

Farmers' Bulletin No. 673 - Irrigation Practice in Rice Growing - by C. G. Haskell, I.E., has just been received from the Government Printing Office.

The report of F. L. Bixby's (I.E.) experiments with discharges through submerged orifices has been approved for publication by the New Mexico Experiment Station.

The report of R. G. Hemphill's investigations on the operation of cooperative companies in the Arkansas Valley, Colorado, made during last season, has been received.

Personal.

S. T. Harding, I.E., who is connected with the University of California, is making a special study of the duty of water on the Minidoka project in Idaho, at the request of the Reclamation Service

V. M. Cone, I.E., who has charge of the hydraulic laboratory at Fort Collins and also of the cooperative work in Colorado, has spent the month on a trip through the West making a study of field conditions to be met in designing new measuring devices. He has arranged for the installation of a new device, which he calls the Venturi flume, in several canals of the U. S. Reclamation Service. Several of these are being installed in the vicinity of Fort Collins also. This has been called the Venturi flume because of the fact that it consists of a flume which is narrower than the channel above and below it, and resembles in that respect the Venturi meter.

F. J. Viehmeyer, A.I.E., who has been carrying on duty of water experiments in the Imperial Valley, California, was operated on for appendicitis recently. At the time of the earthquake in the Imperial Valley, Mr. Viehmeyer, his wife, and one-week-old baby were all in the hospital at El Centro.

F. W. Stanley, I.E., who has been working in Florida since last summer, is working in New England for the summer.

Milo B. Williams, I.E., made a short trip to the Central West during the last month.

